

CLAIMS

- 5 1. An onboard terrain anticollision device for aircraft comprising at least:
- A memory comprising topographic data of the terrain and/or of the obstacles overflown;
 - Information processing means comprising:
 - 10 ○ An input for receiving flight parameters;
 - First trajectory prediction means for establishing on the basis of said flight parameters at least one first profile or a first safety surface corresponding to a first predicted trajectory;
 - 15 ○ First means of topographic calculation for establishing on the basis of said flight parameters at least one first profile or a first topographic surface constituted on the basis of the topographic data of the terrain and/or of the obstacles overflown;
 - 20 ○ First comparison means for establishing at least one first comparison between said first profile or said first safety surface and a first profile or a first topographic surface for determining at least one first risk of collision of the aircraft with the ground;
 - 25 • Alarm means linked to said processing means for establishing at least one first state of first alarm as a function of the results of the first comparison,
- characterized in that
- the information processing means also comprise:
 - 30 ○ Second trajectory prediction means for establishing on the basis of the flight parameters a second profile or a

second safety surface termed the immediate safety surface corresponding to a second predicted trajectory;

- 5 o Second calculation means for establishing on the basis of the flight parameters a second profile or a second topographic surface constituted on the basis of the topographic data of the terrain and/or of the obstacles overflown;
- 10 o Second comparison means for establishing a second comparison between said second profile or said second safety surface and the second profile or the second topographic surface for determining a second risk of collision of the aircraft with the ground;
- 15 • the alarm means can establish a second state termed the second alarm state as a function of the results of the second comparison, different from the first alarm state.

2. The onboard terrain anticollision device as claimed in claim 1, characterized in that the device also comprises:

- Information processing means comprising:
 - Third trajectory prediction means for establishing at least on the basis of the flight parameters a third profile or a third safety surface corresponding to a third predicted trajectory;
 - Third means of topographic calculation for establishing at least on the basis of said flight parameters a third profile or a third topographic surface constituted on the basis of the topographic data of the terrain and/or of the obstacles overflown;
 - Third comparison means for establishing at least one third comparison between said third profile or said third safety surface and a third profile or a third topographic

surface for determining at least one third risk of collision of the aircraft with the ground;

- Alarm means linked to said processing means for establishing at least one state termed the prealarm state as a function of the results of the third comparison.

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3. The onboard terrain anticollision device as claimed in claim 1, characterized in that the first flight time of the second predicted trajectory has a duration of less than 3 seconds.

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4. The onboard terrain anticollision device as claimed in claims 1 to 3, characterized in that the first alarm is of the vertical avoidance alarm type and the second alarm is of the transverse avoidance alarm type, the vertical avoidance alarm corresponding for the pilot to a vertical avoidance maneuver and the transverse avoidance alarm corresponding for the pilot to a transverse avoidance maneuver.

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5. The onboard terrain anticollision device as claimed in one of the preceding claims, characterized in that the first, the second or the third safety surface or profile comprise two parts:

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- a first part corresponding to a first flight time (T_1), dependent on a prediction of the trajectory in progress calculated on the basis of an origin (O) taken under the aircraft;
- a second part corresponding to a second flight time (T_2) following the first flight time, dependent on a prediction of a vertical avoidance trajectory.

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6. The onboard terrain anticollision device as claimed in claim 5, characterized in that the parameters defining the first part of the trajectory or the second part of the trajectory of the immediate safety surface can be substantially different from the parameters defining the other safety surfaces.

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7. The onboard terrain anticollision device as claimed in one of the preceding claims, characterized in that the first, the second or the third safety surface or profile are bounded laterally by a left limit and a right limit, said
5 limits being defined essentially by a lateral margin and at least one angle of left lateral aperture and at least one angle of right lateral aperture.

8. The onboard terrain anticollision device as claimed in claim 7, characterized in that the lateral margins or the angles of right and left lateral
10 aperture of the limit of the immediate safety surface or profile are substantially different from the lateral margins or from the angles of right and left lateral aperture of the limits of the other predicted surfaces.

9. The onboard terrain anticollision device as claimed in one of the preceding claims, characterized in that at least one of the first comparison
15 means or second comparison means comprise a criticality indicator of the risk of collision with the terrain.

10. The onboard terrain anticollision device as claimed in claim 9, characterized in that the criticality indicator depends on the surface or the
20 terrain profile situated above the first or the second or the third safety surface or profile.

11. The onboard terrain anticollision device as claimed in claim 9, characterized in that the criticality indicator depends on the surface or the
25 terrain profile and the terrain height situated above the first or the second or the third safety surface or profile.

12. The onboard terrain anticollision device as claimed in one of the preceding claims, characterized in that the alarms are of audible or visual
30 type.

13. The onboard terrain anticollision device as claimed in one of the preceding claims, characterized in that the information processing means comprise means for managing alarms as a function of the evolution of the risks of collision with the terrain.

14. The onboard terrain anticollision device as claimed in claim 13, characterized in that the alarm management means comprise devices for switching of the transverse avoidance and vertical avoidance alarms.

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15. The onboard terrain anticollision device as claimed in claim 14, characterized in that the switching is performed when the trajectory of the aircraft has evolved noticeably.

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16. The onboard terrain anticollision device as claimed in claim 14, characterized in that the evolution of the trajectory of the aircraft is a change of the slope or of the roll or of the heading of more than a few degrees.